through three-fourths of the circle of the pelvic brim, so that at last it presented occipito-anteriorly in the right oblique diameter.

Dr. Hamilton maintained that the forceps was preferable to turning, because he had seen several children born dead where the latter operation had been employed, and in one case the vertebræ of the neck had become dislocated whilst the child was being extracted, so that delivery could not be completed until the fœtal head had been opened. He always used Ziegler's forceps, and usually applied them after the head had descended so far into the pelvic cavity as to allow the tip of the ear to be easily felt by the finger. In reply to a question put by Dr. Moir, Dr. Hamilton repeated that he had not had a single still-birth among 731 children that he had delivered successively; and in reply to a question by Dr. Figg, he (Dr. H.) explained that although he had delivered some children that died very shortly after birth, yet he did not count a child stillborn if it continued to breathe, if only for five minutes.—*Edinburgh Med. Journ.*, Oct. 1862.

67. *Post-partum Hemorrhage.*—Dr. HAMILTON stated to the Edinburgh Obstetrical Society, that in the treatment of *post-partum* hemorrhage his practice was to clear out the clots from the interior of the uterus, and then to compress the uterus between the two hands. To produce effectual compression he introduced one hand into the vagina and applied it along the back wall of the uterus, and by then applying the other hand on the abdomen he could keep the uterus flattened between the two hands for ten minutes or a quarter of an hour, or three-quarters of an hour, or till such time as all tendency to the recurrence of the hemorrhage had ceased. The uterus could be felt between the two hands like a collapsed India-rubber bottle, and the front and back walls could be held in most accurate contact. He had followed the practice, and that of grasping the mouth of the uterus, for above twenty years, and never saw a case where he could not at once and effectually check the flooding after delivery.

Professor Simpson remarked that the practice recommended by Dr. Hamilton was attended with this drawback in some cases, that the introduction of the hand into the vagina was occasionally so painful that the patient rebelled against it. In one case the patient would not submit to the introduction of the hand except on condition that she were kept under chloroform. He preferred to compress the uterus through the abdominal walls, and found them so relaxed that he could easily pass one hand behind and the other in front of the organ so as to compress it between them.—*Ed. Med. Journ.*, Oct. 1862.

68. *New Transfusion Apparatus.*—Dr. HAMILTON exhibited to the Edinburgh Obstetrical Society an apparatus which he had contrived for the performance of transfusion, and gave the following account of it:—

The method of treating *post-partum* hemorrhage, which I have described in the last October number of the *Edinburgh Medical Journal*, furnishes to the practitioner a simple, and, as far as my experience for upwards of twenty years in its use enables me to speak, a certain and immediate means of restraining this affection. I have said, however, that even where this is done at once and effectually, death may take place from the drain of blood having already been so great, or so rapid, that the system is unable to rally, notwithstanding the use of all the common appliances. Two years since, I met with a painful case of this kind. Returning from the country about two o'clock one afternoon, I was told that urgent messages had been left for me to see a patient in the town, whom I found with all the usual symptoms of extreme depression from flooding. A midwife had delivered her some hours previously, and a brother practitioner in my absence had also seen the woman. I instantly extracted from the uterus a moderate-sized clot of blood, and applied compression with both hands, in the way I have explained in the article referred to, so that I was certain no more blood was lost. Notwithstanding this being done, and also pouring into the patient an abundance of stimulants, the urgent symptoms continued to increase, so that about 3 P. M. her case was becoming desperate. I therefore resolved, with the assistance of my professional brother, to attempt staying the fatal result by transfusion. My transfusing apparatus was not in such exact working

order as to give me perfect confidence in operating with it; and, while getting this remedied, about half an hour was lost, and the patient sunk. I have seen and heard of a good number of such cases in my own neighbourhood, and quite recently a lady under my care very nearly lost her life from an insidious flooding of about four hours' duration. These distressing cases determined me, when next similarly called upon to act, to have my transfusing apparatus in working condition, and especially to have the syringe in such a state as to secure me from the risk of pumping air, instead of blood, into the patient. I was not very much encouraged by the trials I made on this subject, and I at first thought of connecting with the tube leading from the syringe a glass trap, to catch bubbles of air, if they should by accident get mixed with the blood; and, thinking more upon the subject, I asked myself whether there existed any necessity for a syringe at all. The result was, the construction of the simple little instrument which I now exhibit. It consists of a funnel for receiving the blood, say four inches broad at the mouth, with a stop-cock attached to it; of a small tube, for introduction into the vein of the patient, also having a stop-cock attached to it; and of an India-rubber tube, two feet long, for connecting the two. In operating with this instrument, I propose that the patient should be placed at a lower level than the person from whom the blood is to be drawn, so that we may have, 1st, The force of gravitation to impel the blood forwards; and, 2d, That we may thus effectually provide for the non-entrance of air into the veins, as the air, being the lighter body, must always keep on the surface. In order to test the practical working of this instrument, I got two dogs, upon which I performed a few experiments. Having heated the instrument, by pouring warmish water through it, in the first experiment I opened the jugular vein of the dog from which the blood was to be taken, and allowed the blood to issue from the tubule before this was introduced into the same vein of the other dog. I did this in order to expel the air, but found that, during the time thus lost, the blood in the funnel and tube had coagulated. In my next experiment I avoided the chance of this happening, by filling the tube and the lower portion of the funnel with warmish water, introducing the tubule into the vein, and then opening the vein of the dog from which the blood was to be drawn. In this way a small quantity of the blood ran off, but still coagulation took place too rapidly to make the experiment satisfactory. In my third experiment I used simply luke-warm water, and then I found I could with ease inject any quantity I desired. I now tried the action of the apparatus with human blood. I first filled it, as before, with luke-warm water, and shut the stop-cocks; and, just before opening the vein of the patient, emptied out the whole except what remained in the tube and bottom of the funnel, which I afterwards found amounted to about two drachms. As soon as two or three drachms of blood had been drawn, I opened both stop-cocks, and allowed it to run off, and I found that it ran in a continuous stream into a plate, until I had obtained the quantity I wished to abstract, viz., about eighteen ounces. I found that, by regulating the stop-cock connected with the funnel, I could, with great ease, keep only a few drachms in the funnel, thus making the transfer from the patient to the plate almost immediate. I repeated this experiment, with exactly the same result: the blood in the plate presenting next day, as far as I could judge, precisely the same appearance as if it had been drawn direct from the patient. I find that water falls through the whole length of the tube in about 2½ seconds, and an ounce of water runs off from the funnel in 8 seconds, so that the exposure of the blood, where the stream is kept continuous, must be very trifling, and probably will be found, when the instrument used is made entirely, or chiefly, of non-conducting materials, neither to lower its temperature much, nor to alter unfavourably its vital properties. Combining the results of the two sets of experiments, there seems to be little reason to doubt that transfusion of blood, or injection of water or other fluids, might with ease be effected with this instrument in the human subject, or in animals. Transfusion with dog's blood is much more difficult than where human blood is employed. Dr. Blundell found that the first coagulates in 10 seconds, whereas the latter takes 60 seconds to coagulate; and hence, no doubt, the reason why he employed human blood to transfuse into dogs.

My feeling is, that many lives are annually lost, in obstetric practice alone,

from loss of blood; and, looking at the recorded cases I have seen in which transfusion had been employed, it seems to me that they offer great encouragement to its more frequent use. The great obstacles I think hitherto to using it have been, the complexity and expense of the apparatus used, the dread of introducing air in dangerous quantities into the veins from the use of the syringe, and timidity on the part of the surgeon, from want of dexterity or want of practice, in performing the operation. If my anticipations be correct, such an instrument as I have exhibited may remove the two former obstacles, for it is so simple, that it can with the greatest ease be cleaned and kept in order; it will cost only a few shillings, and could therefore be in every practitioner's possession; and, with the most ordinary care, it renders impossible the entrance of air into the veins. As to the third obstacle I have mentioned, practitioners could easily remove it by performing a few experiments on dogs, with water instead of blood: the injection of a moderate quantity at a proper temperature apparently doing them no harm. I will only add the usual caution given in these cases, that the experimenter be careful to expose properly the vein before incising it, otherwise he will run great risk of injecting the fluid into the cellular tissue, instead of the vein. I was assisted in my experiments by Mr. Heriot, veterinary surgeon, Falkirk, who secured the dogs, and applied the ligature to "start" the vein. After shaving off the hair, I pinched up the skin over the vein with my left thumb and forefinger, made an incision with a sharp curved bistoury in the course of the vein, gently dissected the cellular tissue from the vein, and then opened it.

After I had made the experiments I have detailed, I found, on consulting Dr. Blundell's paper on Transfusion, and his Principles of Midwifery, published in 1839, that he also had the idea that an instrument of a simple kind might be used in transfusion instead of the syringe, but, curiously enough, he seems never to have constructed or employed it. In his Principles of Midwifery (p. 255), he says, "transfusion from artery to vein, or perhaps even from vein to vein, might be accomplished by tubule simply;" that is, as I understand it, by connecting the two together; and again, "a fall of two or three inches, perhaps less, is sufficient to move by gravitation the blood into the vein." Dr. Blundell proposes to call this a "gravitator," and the name seems a very appropriate one both for his and my own instrument. Instead of two or three inches of a fall, however, I think that in my instrument great advantage will result from having the India-rubber tube two feet in length, as this both gives facility in adapting the instrument, and furnishes no more than enough of gravitating power for propelling the fluid, as a substitute for the syringe. It seems to me, however, that quite sufficient force can be thus acquired for what is wanted, of a kind, too, somewhat like the equable gentle force employed by nature in the venous circulation; and that, until coagulation takes place, there need be little fear of the flow of blood keeping continuous. If coagulation has taken place, any exertion of force with a syringe or otherwise would only, I think, be likely to do harm, by propelling coagula into the veins. In such a case, much the best plan, I think, would be at once to remove the instrument, clean it out, and reapply it.

In transfusing in the human subject, I would be inclined to proceed in the same way as I did in my second experiment on the dogs. Filling the instrument with water of the proper temperature, and introducing the tube into the vein of the patient, before the supplying vein is opened, will both prevent any material abstraction of heat from the blood, and will also obviate the risk of coagulation, should any unexpected delay occur. The two drachms of water that would thus be first introduced into the veins, would probably be beneficial rather than otherwise.

In the instrument I have used, the two stop-cocks and the tube to introduce into the vein are metallic; but Messrs. Thornton inform me, that these, as well as the funnel, could be made of vulcanite, one of the best materials I know of for such a purpose, being both a good non-conductor of heat, and little liable to alteration of its surface. Any one wishing to possess such an instrument may obtain it by applying to Messrs. Thornton, India-rubber Warehouse, Princes Street, Edinburgh.—*Ed. Med. Journ.*, Oct. 1862.